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INSTITUTE FOR INFORMATION TECHNOLOGY APPLICATIONS

US AIR FORCE ACADEMY

Google Pilot / WEdge Viewer

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Technical Report
TR-09-4

July 2009

		Form Approved OMB No. 0704-0188

Report Documentation Page

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1. REPORT DATE **JUL 2009**	2. REPORT TYPE	3. DATES COVERED **00-00-2009 to 00-00-2009**

4. TITLE AND SUBTITLE **Google Pilot/Wedge Viewer**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Institute for Information Technology Applications, US Air Force Academy, US Air Force Academy, CO**	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT **Approved for public release; distribution unlimited**

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**11**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

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Autobiography of the Author

Lt Col Andrew J. "Skipper" Berry is an F-16 pilot with over 100 hours of combat time and 3500 hours total time. He is currently the director for Warfighter's Edge at the Institute for Information Technology Applications (IITA), United States Air Force Academy in Colorado Springs, Colorado. Lt Col Berry directs a team of eighteen on the technical coding, design and implementation of the program.

A native of Denver, Colorado, Lt Col Berry is a Distinguished Graduate of Colorado State University Air Force ROTC Program. After receiving his commission in May 1989, with a degree in Computer Science, he attended Undergraduate Pilot Training at Reese AFB, Lubbock, Texas. He earned his aeronautical rating in January 1991. From graduation until July 1996, Lt Col Berry was a T-37 Instructor Pilot where his programs earned four distinct benchmarks during a USAF inspection. From July 1996 to March 1997 he attended F-16 RTU and had a follow on assignment to Hill AFB until February 2000. After leaving the Active Duty in February 2000, Lt Col Berry went on to continue to fly F-16s at the Oklahoma Air National Guard, Tulsa, Oklahoma. There he specialized in a unique briefing system for flight briefing rooms and continued to improve and teach this technology to the Air National Guard. During April, 2005, during one of his presentations on this technology, he was hired by the Air Force Reserves to work at the Institute for Information Technology Applications, where the concept became a system of record for Air Combat Command. As the director of Warfighter's Edge, IITA he has overseen three major programs included in the Air Force and continues to improve upon these products.

Google Pilot / WEdge Viewer

Project Description

This paper summarizes the activity of USAF Academy cadet work on the Google Earth project for the CS 453/454 capstone course. The Google Pilot cadet project was a computer science 453/454 year long capstone project. Lt Col Berry led the students in their creation of a formalized system realized by Capt Jacobson a C-17 pilot. This project was demonstrated to leadership in the Air Force and was selected to be included into the next version of PFPS (Portable Flight Planning Software) released in late 2010, now called the WEdge Viewer.

Background Information

Google Earth is a robust program that pilots have been using to obtain good imagery and information for years. Despite the DoD policies, pilots would still get information from the Internet from home or other locations. A natural follow on when obtaining imagery is trying to plot mission routes so pilots can view where they are going in a 3D world.

Captain Mark Jacobson wrote the original "Google Pilot" program and his code and concepts can be found at www.googleearthpilot.com on the NIPRnet, gis.geoint.nga.smil.mil/GoogleEarth/googleearthpilot on SIPR and gis.geoint.nga.ic.gov/GoogleEarth/googleearthpilot for JWICS. With this application written by Captain Jacobson, the results were a KML file, forcing the user to open up the Google Earth thick client, and then read the KML file and display results. Additionally, automatic integration of DAFIF (Digital Aeronautical Flight Information File) data was not possible. Although this is a very popular product in use by units.

From pilot planning to Special Operations including the Army, the FalconView product is used everywhere by combat forces. FalconView is a product created and maintained by Georgia Tech Research Institute that displays pilot mission planning information over a myriad of two dimensional maps displayed as the user desires.
FalconView drawbacks include viewing things in a two dimensional system from a God's eye view See Figure 1.
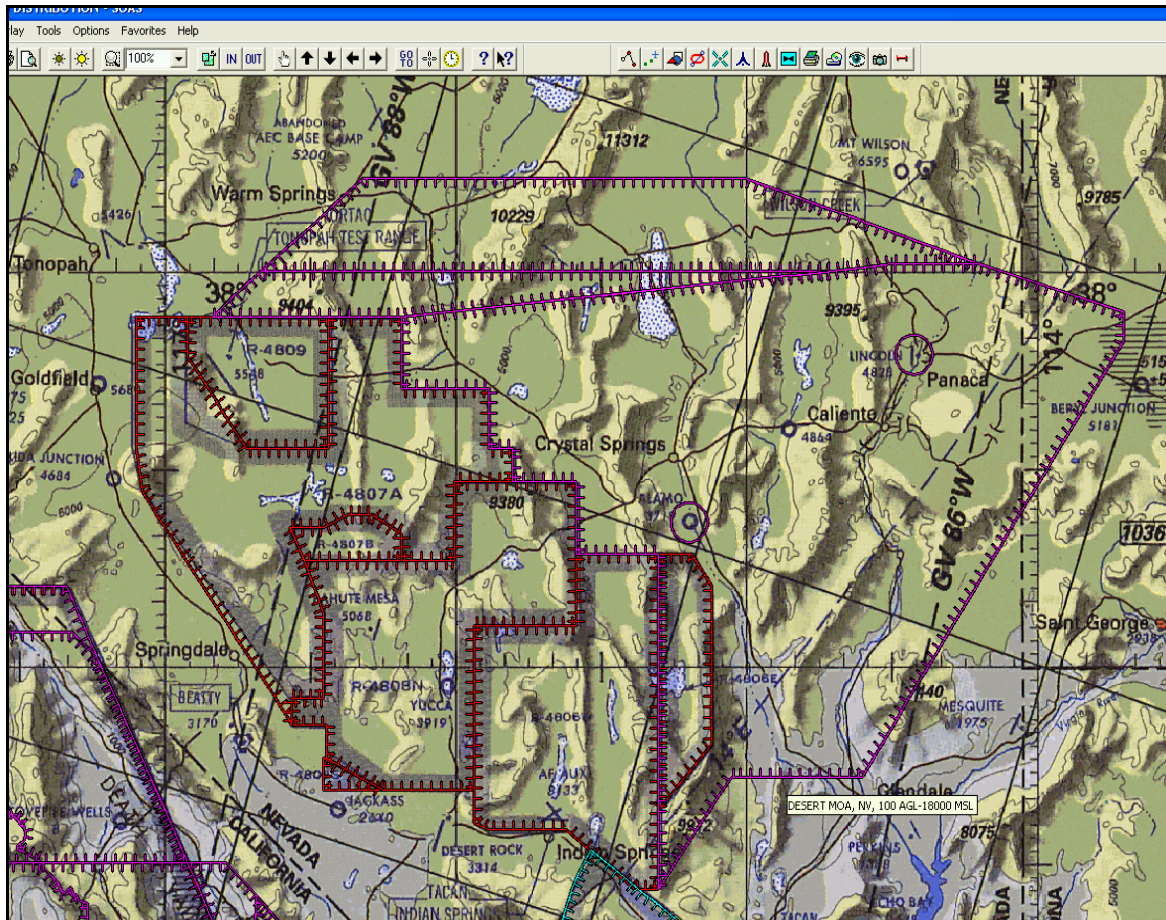
Figure 1 - FalconView screen capture showing Nellis Airspace

While actually flying and combat is nothing like this view, the FalconView product was and continues to be an amazing product for our combat forces. The Google Pilot application written by Captain Jacobson, allows for pilots to view their data in a 3D world, simply and effectively See Figure 2.
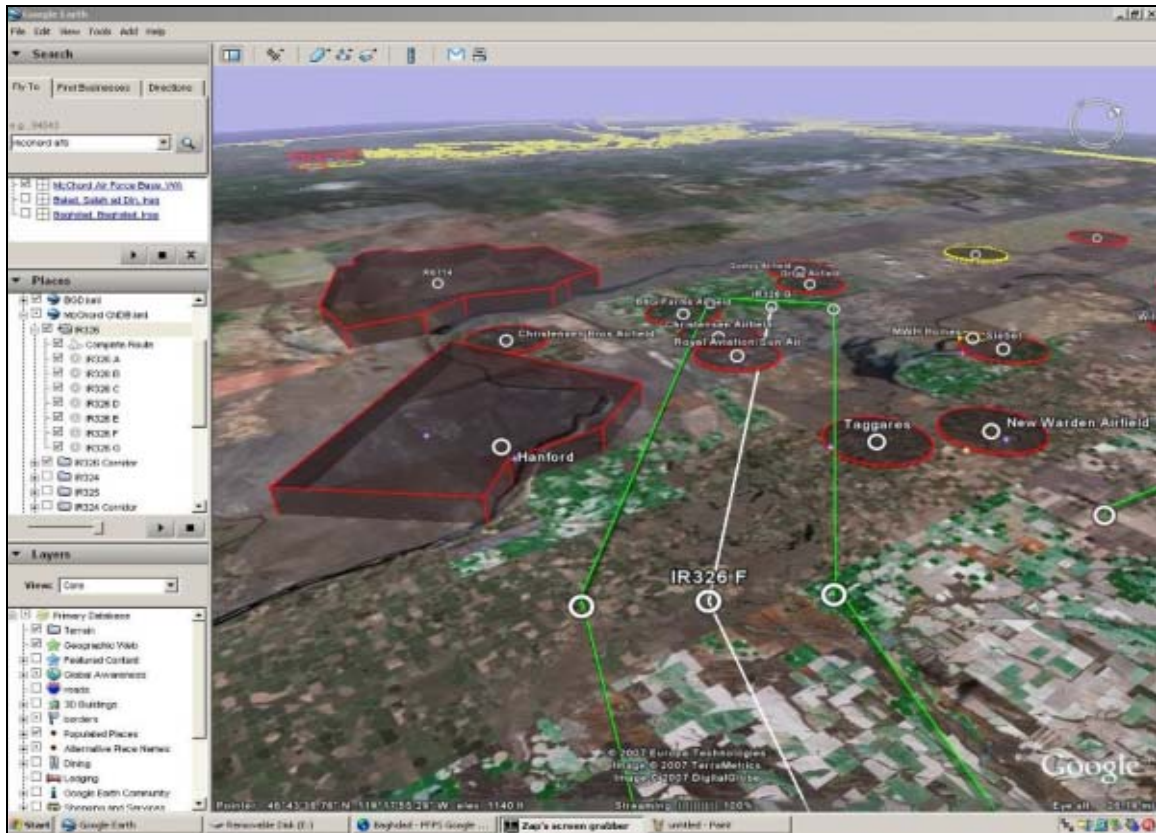
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Figure 2 - Previous Google Pilot Application - Running in Google Earth

From this concept, the cadets were given a task to rewrite the C#.NET application originally written by Captain Jacobson and integrate it into a single solution that shows the view and interface together. Research on FalconView designs were required by the cadets to provide a familiar interface for those that have worked with FalconView. The cadets ended the year with a formal briefing to the Dean, Commandant, and General McCarthy.

Project Overview

The cadet project began with the Cadets creating a simple interface. They were instructed to include the Google API, which is written for a web application and does not require the full Google Earth product installed. On the left side of the application, click "find options" and capability was described. (See Figure 3) By clicking on a bar, the filtering options were present for the user. Clicking a simple on/off capability was described but never implemented.

The primary data source defined was the DAFIF.mdb file inside FalconView. From that database, the cadets were able to convert that data into KML and interface with their own code structure and eventually to the display. A similar path was taken for route files, which require a 3rd party application called the "route server" to be active. All interaction with FalconView routes was done through the route server. See Figure 4.
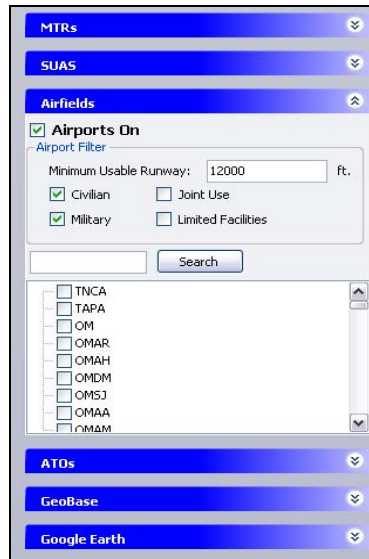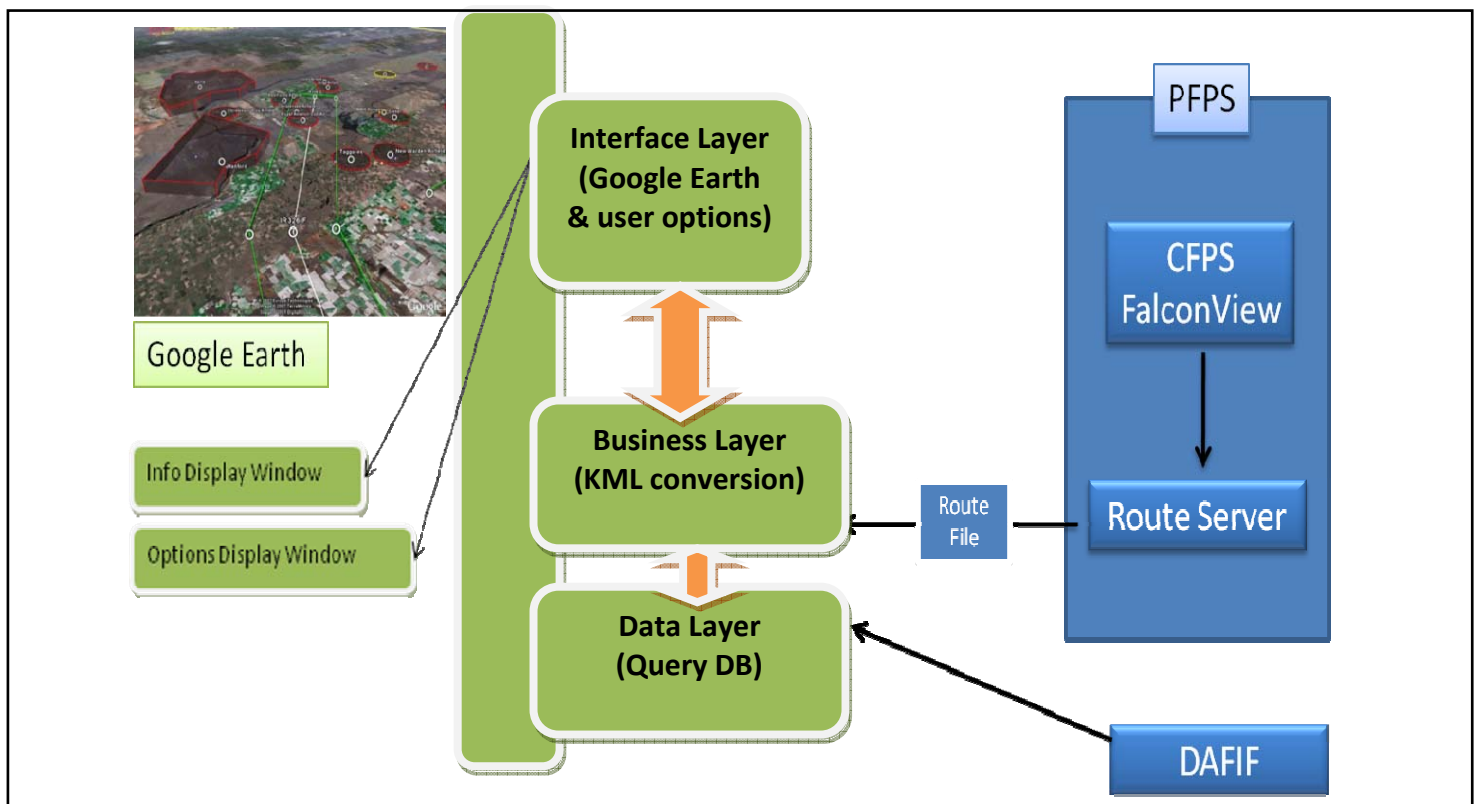
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Figure 3 - Cadet Coded Interface

Figure 4 - Module Decomposition

The final product included information about the airfield and other data. By clicking on an airfield, more information about the object is visible (see Figure 5). This demonstrates the cadet's capability to obtain more information about the airfield than just the coordinates and plotting them on the map.
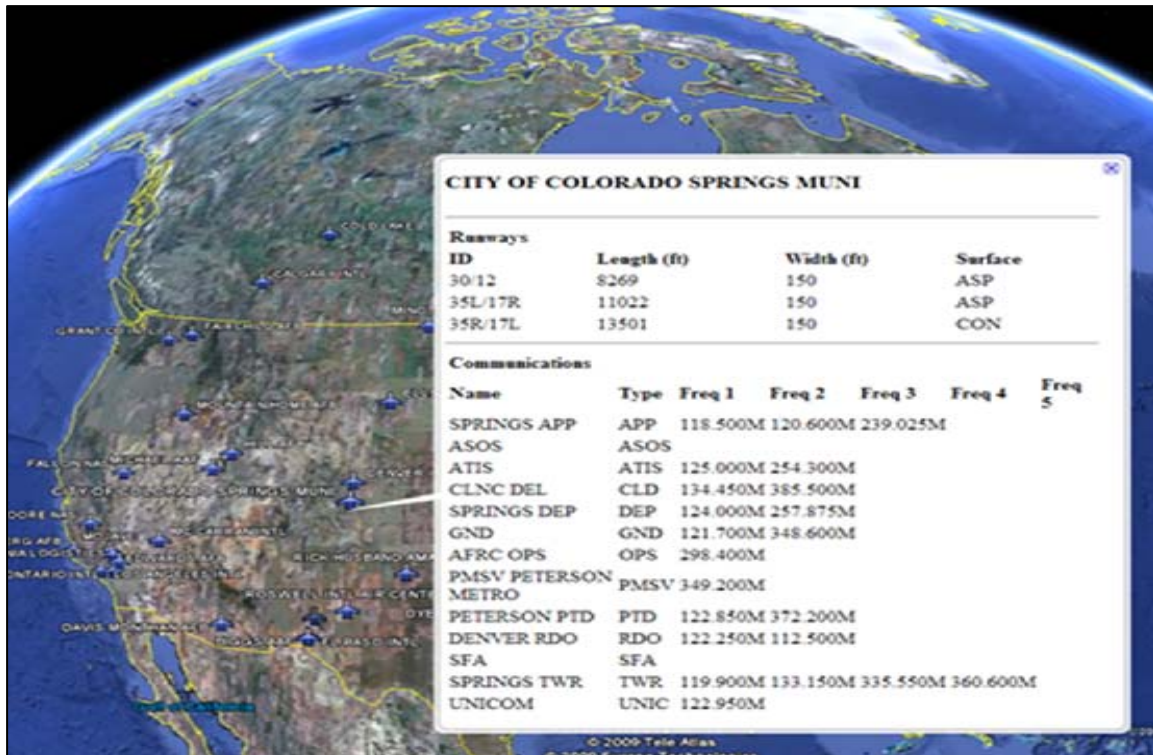
Figure 5 - Information Popup

Additional data sources were needed, but due to time constraints the cadets could not finish another source other than airfield information.

The final cadet project was a functional interface for airfields, obtaining data from the DAFIF.mdb file and plotting that directly on a screen with Google Earth imbedded. See Figure 6.
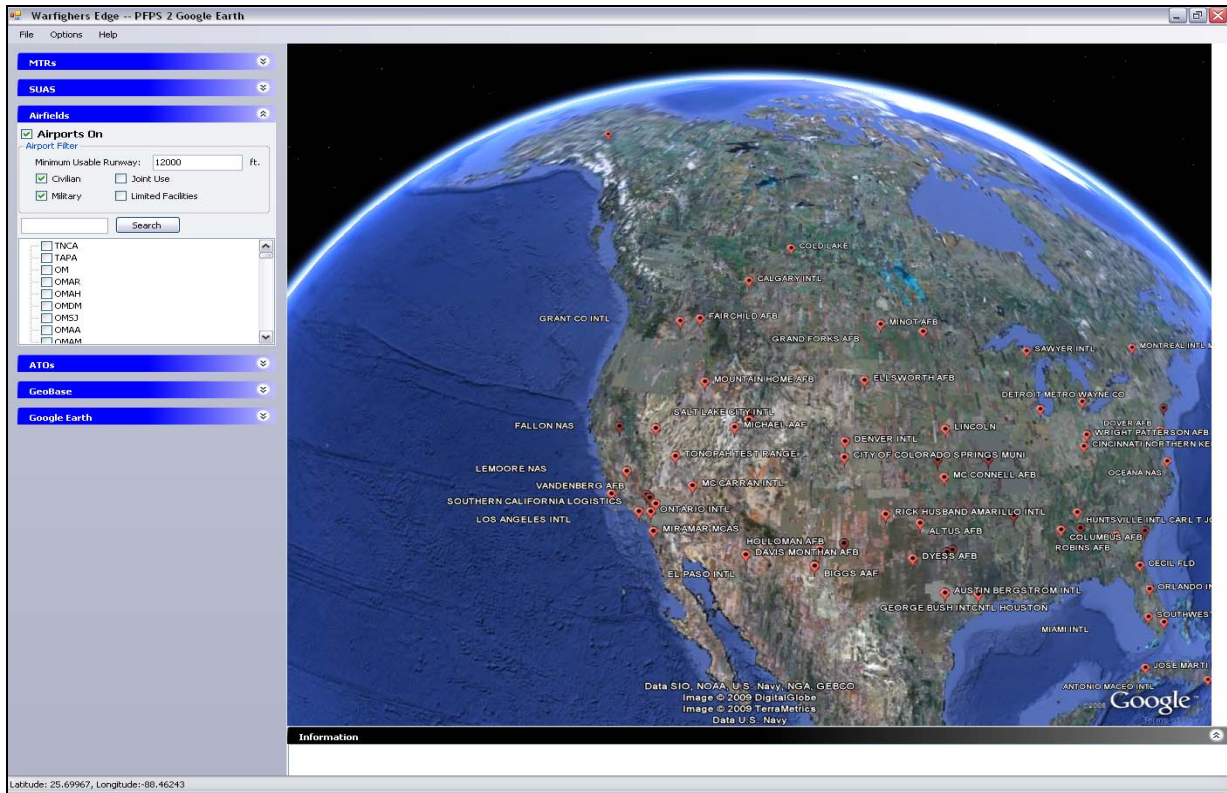
Figure 6 - Full Cadet Code showing airfields

Conclusions

By putting the development into the hands of the cadets, creative solutions were discovered. Research was required in determining how to integrate a Google Earth API into an executable solution when the API was designed for web use only. The cadets overcame this obstacle and generated a solution whereby the executable product emulates a web environment to host the API – ingenious.

Additional research was done to determine how to get information from the FalconView DAFIF (Digital Aeronautical Flight Information File) and implement that in a 3D environment. The DAFIF information is ingested by FalconView and manipulated to the DAFIF.mdb database format. The overall concept of the Google Earth viewer was created by an Air Force pilot. While this is a highly effective thought, his time to maintain the code was diminishing and eventually overcome. Using the cadets to implement this solution is an outstanding avenue for getting products into the Air Force.

Future Research

The WEdge development team has taken ownership of this project and no future research will be required by the Institute for Information Technology Applications. However, future research by the WEdge team will be utilized through users of the Air Force to identify other potential uses for geospatial information.

For more information about this or any Warfighter's Edge product, please contact us at info@wedge.hpc.mil

ABOUT THE INSTITUTE

The Institute for Information Technology Applications (IITA) was formed in 1998 to provide a means to research and investigate new applications of information technology. The Institute encourages research in education and applications of the technology to Air Force problems that have a policy, management, or military importance. Research grants enhance professional development of researchers by providing opportunities to work on actual problems and to develop a professional network.

Sponsorship for the Institute is provided by the Dean of Faculty at the U.S. Air Force Academy among others. IITA coordinates a multidisciplinary approach to research that incorporates a wide variety of skills with cost-effective methods to achieve significant results. Proposals from the military and academic communities may be submitted at any time since awards are made on a rolling basis. Researchers have access to a highly flexible laboratory with broad bandwidth and diverse computing platforms.

To explore multifaceted topics, the Institute hosts single-theme conferences to encourage debate and discussion on issues facing the academic and military components of the nation. More narrowly focused workshops encourage policy discussion and potential solutions. IITA distributes conference proceedings and other publications nation-wide to those interested or affected by the subject matter.